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(54) APPARATUS AND METHOD FOR RECORDING INFORMATION, INFORMATION RECORDING PROGRAM AND RECORDING MEDIUM RECORDING INFORMATION RECORDING PROGRAM

(57)Abstract:
PROBLEM TO BE SOLVED: To manage entry points so that a user can recognize them.
SOLUTION: An information recording apparatus is provided with a receiving section for receiving a stream comprising coded digital data, an analyzing section for detecting changes in the attributes of the received data to output detecting information, a control section for obtaining the outputted detecting information and hour information about the hour of changing as a first entry point and generating management information in which the first entry point is registered, and a drive device for storing the management information and the stream in an information recording medium. This device is also provided with an input section for inputting a second entry point preset for a reproduction path of the stream to arbitrarily access the stream and reproduce it. The control section generates management information in which the first and second entry points are registered so that they can be identified.

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CLAIMS

[Claim(s)]
[Claim 1] With the receive section which receives the stream which consists of encoded digital data The analysis section which detects change of the attribute of said stream which the receive section received, and outputs detection information, Said detection information outputted from the analysis section and the time information in the time of day which produced said change are acquired as the 1st entry point. The control section which generates the management information which registered this 1st entry point, Said management information which the control section generated, and said stream which the receive section received It is the information recording device equipped with the drive equipment recorded on an information record medium. It has further the input section which inputs the 2nd entry point set as said stream to the salvage pathway of said stream for accessing arbitration and reproducing. A control section The information recording device which generates the management information which registered said the 1st entry point and said 2nd entry point identifiable.
[Claim 2] A control section is an information recording device according to claim 1 which generates the management information containing the 1st table which registered said 1st entry point, and the 2nd table which registered said 2nd entry point.
[Claim 3] A control section is an information recording device according to claim 1 which generates the management information which has a different discernment flag separately given to said the 1st entry point and said 2nd entry point.
[Claim 4] Change of a program in case said stream of the analysis section is a digital broadcast stream, Change of the PSI/SI information on the digital broadcast stream which controls playback of a stream, Change of multi-view information, change at the head of a data karroo cel, modification of the contents of the data karroo cel, Change of the programmed map table PMT, change of a module, change of a data event, The information recording device according to claim 2 which detects at least one of the

change **s of sequence header information in case change of parental information, change of the attribute of a voice stream, and said stream are MPEG video streams of digital broadcast as change of the attribute of said stream.

[Claim 5] Said management information is the information recording device according to claim 4 with which said the 1st entry point and said 2nd entry point were equipped with the link information to AV data recorded on the information record medium.

[Claim 6] The read-out section which reads said management information recorded on said information record medium, and said stream, The decoder which decodes said stream which the read-out section read, It has further the output section which outputs said management information which the read-out section read, and said stream which the decoder decoded. In case said 2nd entry point is inputted from the input section The read-out section reads said management information. Said output section The information recording device according to claim 2 which displays said 1st entry point registered into said 1st table of said management information, and said 2nd entry point registered into said 2nd already inputted table.

[Claim 7] The read-out section which reads said management information recorded on said information record medium, and said stream, The decoder which decodes said stream which the read-out section read, It has further the output section which outputs said management information which the read-out section read, and said stream which the decoder decoded. The read-out section It is the information recording device according to claim 2 with which said output section displays said 2nd entry point registered into said said 2nd table of said management information by reading said management information.

[Claim 8] Said information record medium is an information recording device according to claim 3 which is an optical disk.

[Claim 9] The step which receives the stream which consists of encoded digital data, The step which detects change of the attribute of said stream and outputs detection information, The step which generates the management information which registered said outputted detection information and the time information in the time of day which produced said change as the 1st entry point, Said generated management information and said stream which the receive section received It is the information record approach equipped with the step recorded on an information record medium. It has further the step which inputs the 2nd entry point set as said stream to the salvage pathway of said stream for accessing arbitration and reproducing. Said step to generate is the information record approach which generates the management information which registered said the 1st entry point and said 2nd entry point identifiable.

[Claim 10] Said step to generate is the information record approach according to claim 9 which generates the management information containing the 1st table which registered said 1st entry point, and the 2nd table which registered said 2nd entry point.

[Claim 11] Said step to generate is the information record approach according to claim 9 which generates the management information which has a different discernment flag separately given to said the 1st entry point and said 2nd entry point.
[Claim 12] The step which receives the stream which consists of encoded digital data, The step which detects change of the attribute of said stream and outputs detection information, The step which generates the management information which registered said outputted detection information and the time information in the time of day which produced said change as the 1st entry point, Said generated management information and said stream which the receive section received It is the information record program which can be executed by computer which consists of a step recorded on an information record medium. It has further the step which inputs the 2nd entry point set as said stream to the salvage pathway of said stream for accessing arbitration and reproducing. Said step to generate is the information record program which can be executed by computer which generates the management information which registered said the 1st entry point and said 2nd entry point identifiable.
[Claim 13] Said step to generate is an information record program according to claim 12 which generates the management information containing the 1st table which registered said 1st entry point, and the 2nd table which registered said 2nd entry point.
[Claim 14] Said step to generate is an information record program according to claim 12 which generates the management information which has a different discernment flag separately given to said the 1st entry point and said 2nd entry point.
[Claim 15] The record medium which recorded the information record program according to claim 13.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the information record medium with which the multimedia data which are the information record medium which can be written and contain data of various formats, such as dynamic-image data, still picture data, and audio data, especially are recorded. Furthermore, this invention records

information on such an information record medium, or relates to the equipment and the approach of reproducing the recorded information.

[0002]

[Description of the Prior Art] read-only optical discs, such as a recent-years and DVD(Digital Versatile Disc)-ROM disk (it is also only called DVD-ROM), -- the use as a computer data storage medium -- in addition, it is utilized as still pictures, such as animations, such as a movie, and a photograph, and a storage of voice data ("AV data" is called hereafter). The phase change mold disk which is called a DVD-RAM disk (it is also only called DVD-RAM) and which has the capacity of several GB is put in practical use as a storage which can be written in recent years further at any time.

[0003] Moving Picture ExpertsGroup (MPEG) which is the coding specification of the international standards of digital AV data, or utilization and the interval of MPEG 2 are expected for DVD-RAM only as a record medium of computer data as record / playback media in an audio video (AV) technical field. That is, spread is predicted as media replaced with the magnetic tape which is the conventional typical AV archive medium.

[0004] It is a future big technical problem how the engine performance which records AV data and exceeds the conventional AV equipment greatly, and a new function are realized using the optical disk which aims at these large capacity-ization.

[0005] The greatest description by use of a disk is large improvement in the random access engine performance. When carrying out random access of the tape temporarily, the time amount of several minute order is usually required for rewinding [of one roll]. This is extraordinarily late compared with the seek time (about several 10ms) in optical disk media. Therefore, a tape cannot become a random access device practically. With such random access engine performance, distributed record of impossible AV data became possible with the optical disk on the conventional tape.

[0006] Drawing 1 is the block diagram of the drive equipment of a DVD recorder. Drive equipment is equipped with the switch 14, the encoder section 15, and the decoder section 16 which change I/O of 13 to the optical pickup 11 which reads the data of the DVD-RAM disk 10, the ECC (Error Correcting Code) processing section 12, one track buffer 13, and a track buffer.

[0007] As shown in drawing, data are recorded on the DVD-RAM disk 10 by making 1 sector =2KB into a smallest unit. Moreover, error correction processing is performed in the ECC processing section 12 as a 16 sector =1ECC block.

[0008] A track buffer 13 is used in order to record AV data on the DVD-RAM disk 10 more efficiently, and to record AV data with a Variable Bit Rate. If it explains in more detail, AV data will be used in order that a track buffer 13 may absorb the difference of this bit rate, since a bit rate (Vb) changes according to the complexity of those contents (if it is video image) to the R/W rate (Va) to DVD-RAM100 being a fixed rate. Also when discrete arrangement of the AV data is carried out on a disk 10 using a

track buffer 13, it is still more effectively possible to carry out continuation supply of the AV data to the decoder section 16. Moreover, AV data with which it was sent to the encoder section 15 also in the image transcription are recordable on DVD-RAM.

[0009] Since DVD-RAM which is this mass archive medium is used more effectively, in DVD-RAM, a UDF (Universal Disc Format) file system is adopted, and access by PC is possible. The detail of a UDF file system is indicated by "Universal Disc Format Standard."

[0010] Next, the AV equipment which we have used is explained conventionally. Drawing 2 is drawing having shown the conventional AV equipment and the relation of media and a format. For example, if it thinks that a user will look at the image of a video tape, a user will put a videocassette into VTR, and it will view usually and listen on television. Moreover, if you think that he will listen to music, a user will put CD into a CD player or CD radio cassette recorder, and will hear it by the loudspeaker or headphone. That is, in the conventional AV equipment, one media existed per format (video or audio). For this reason, to contents to want to look at or hear, the user always needed to exchange media and an AV equipment and sensed inconvenient.

[0011] Moreover, the DVD videodisk has been put in practical use in the software package and digital satellite broadcasting service has been put in practical use by the broadcast system by the spread of digital techniques in recent years. It cannot be overemphasized that these backgrounds have utilization of innovation of a digital technique, especially an MPEG format.

[0012] Drawing 3 is the DVD videodisk mentioned above and drawing of the MPEG stream currently used by digital satellite broadcasting service. MPEG specification specifies a layered structure as shown in drawing 3 . The stream of the MPEG system layer which, as for an important thing, application finally uses is differing by package media system like a DVD videodisk, and communication-medium system like digital satellite broadcasting service here. The former is called an "MPEG program stream" and a data transfer is performed in the pack unit which was conscious of the sector (in the case of DVD 2048 bytes) used as record units, such as a DVD videodisk. The latter is called an "MPEG transport stream" and a data transfer is performed per TS packet of a 188-byte unit especially being conscious of ATM.

[0013] Although it has been expected that AV data can be freely dealt with by MPEG which is a digital technique and the coding technique of image voice, without being dependent on media, there is also such a delicate difference and the AV equipment or media corresponding to both sides of package media and a communication medium do not exist by current. Therefore, the inconvenient dissolution currently sensed with the conventional AV equipment is expected by the appearance of mass optical disks, such as DVD-RAM.

[0014] An appearance of the optical disk which can record an MPEG transport stream similarly with an MPEG program stream is desired especially with initiation of digital

satellite broadcasting service.

[0015]

[Problem(s) to be Solved by the Invention] To be able to carry out the display playback of various formats and contents freely with single media as show a DVD recorder to drawing 4 , and a single AV equipment, without a user being conscious of each format is desired. When it explains concretely, drawing 5 is an example of the menu screen in a DVD recorder. It is selectable on a television screen, without "1 Oil-painting theater" of digital satellite broadcasting service and "4 Beethoven" who dubbed from "the morning serial drama", the "World Cup final", and CD of terrestrial broadcasting being conscious of the media of a recording agency, or a record format with this menu.

[0016] The biggest technical problem at the time of using the optical disk expected as a next-generation AV archive medium, and realizing such a DVD recorder is whether AV data which consist of various formats, and AV stream are [how] systematically manageable. If only the format which already exists is managed, it is not necessary to use the special management technique. However, it is indispensable to implementation of the DVD recorder mentioned above to use the management technique which can respond also not only to much existing formats but to the new format which will appear from now on.

[0017] It may be necessary to operate it by a user being conscious for every inconvenient [inconvenient / which explained various AV streams in the conventional example depending on the difference in the user interface produced by the ability to treat systematically], i.e., contents, and format. Therefore, how the data digitized by the transmitting side like digital broadcast also in various AV streams are dealt with by the receiving side poses a big problem. In order to realize the so-called time shift which can use various functions of the digital satellite broadcasting service newly started especially also after an image transcription, it is necessary to record, where [as it is] these streams are transmitted. In the transport stream of MPEG, it is possible to multiplex two or more video streams to coincidence (multi-view).

[0018] also from the new digital broadcast which will furthermore appear in the future and which will come out and exist, even if a part of the contents of service are undecidedness at present, carrying out time shift record of these broadcasts will be called for.

[0019] An entry point is mentioned to AV data by which digital recording was carried out as an example which harnesses the random access nature which is the greatest description of disk media. In recent years, the need that a user sets up a desired point (entry point), accesses the set-up entry point, and enables it to start playback from this point is increasing. However, the entry point which a recording device records automatically also exists. Therefore, since derangement will be produced if these entry points are made intermingled, distinguishable DS is needed.

[0020] The purpose of this invention is managing an entry point so that it may be easy to understand a user. Moreover, it is reproducing the data which enabled it to record the stream (MPEG transport stream) used by digital broadcast with various AV streams, and recorded it further.

[0021]

[Means for Solving the Problem] With the receive section which receives the stream by which the information recording apparatus by this invention is constituted from encoded digital data The analysis section which detects change of the attribute of said stream which the receive section received, and outputs detection information, Said detection information outputted from the analysis section and the time information in the time of day which produced said change are acquired as the 1st entry point. The control section which generates the management information which registered this 1st entry point, Said management information which the control section generated, and said stream which the receive section received It is the information recording device equipped with the drive equipment recorded on an information record medium. It has further the input section which inputs the 2nd entry point set as said stream to the salvage pathway of said stream for accessing arbitration and reproducing. A control section The management information which registered said the 1st entry point and said 2nd entry point identifiable is generated. Thereby, the above-mentioned purpose is attained.

[0022] A control section may generate the management information containing the 1st table which registered said 1st entry point, and the 2nd table which registered said 2nd entry point.

[0023] A control section may generate the management information which has a different discernment flag separately given to said the 1st entry point and said 2nd entry point.

[0024] Change of a program in case said stream of the analysis section is a digital broadcast stream, Change of the PSI/SI information on the digital broadcast stream which controls playback of a stream, Change of multi-view information, change at the head of a data karroo cel, modification of the contents of the data karroo cel, Change of the programmed map table PMT, change of a module, change of a data event, At least one of the change **s of sequence header information in case change of parental information, change of the attribute of a voice stream, and said stream are MPEG video streams of digital broadcast may be detected as change of the attribute of said stream.

[0025] Said management information may be equipped with the link information to the data with which said the 1st entry point and said 2nd entry point were recorded on the information record medium.

[0026] The read-out section which reads said management information recorded on said information record medium, and said stream, The decoder which decodes said

stream which the read-out section read, It has further the output section which outputs said management information which the read-out section read, and said stream which the decoder decoded. In case said 2nd entry point is inputted from the input section The read-out section may read said management information, and said output section may display said 1st entry point registered into said 1st table of said management information, and said 2nd entry point registered into said 2nd already inputted table.

[0027] The read-out section which reads said management information recorded on said information record medium, and said stream, The decoder which decodes said stream which the read-out section read, It has further the output section which outputs said management information which the read-out section read, and said stream which the decoder decoded. The read-out section Said management information may be read and said output section may display said 2nd entry point registered into said said 2nd table of said management information.

[0028] Said information record medium may be an optical disk.

[0029] The step which receives the stream by which the information record approach of this invention is constituted from encoded digital data, The step which detects change of the attribute of said stream and outputs detection information, The step which generates the management information which registered said outputted detection information and the time information in the time of day which produced said change as the 1st entry point, Said generated management information and said stream which the receive section received It is the information record approach equipped with the step recorded on an information record medium. It has further the step which inputs the 2nd entry point set as said stream to the salvage pathway of said stream for accessing arbitration and reproducing. Said step to generate generates the management information which registered said the 1st entry point and said 2nd entry point identifiable. Thereby, the above-mentioned purpose is attained.

[0030] Said step to generate may generate the management information containing the 1st table which registered said 1st entry point, and the 2nd table which registered said 2nd entry point.

[0031] Said step to generate may generate the management information which has a different discernment flag separately given to said the 1st entry point and said 2nd entry point.

[0032] The step which receives the stream by which the information record program by this invention is constituted from encoded digital data, The step which detects change of the attribute of said stream and outputs detection information, The step which generates the management information which registered said outputted detection information and the time information in the time of day which produced said change as the 1st entry point, Said generated management information and said stream which the receive section received It is the information record program which

can be executed by computer which consists of a step recorded on an information record medium. It has further the step which inputs the 2nd entry point set as said stream to the salvage pathway of said stream for accessing arbitration and reproducing. Said step to generate generates the management information which registered said the 1st entry point and said 2nd entry point identifiable. Thereby, the above-mentioned purpose is attained.

[0033] Said step to generate may generate the management information containing the 1st table which registered said 1st entry point, and the 2nd table which registered said 2nd entry point.

[0034] Said step to generate may generate the management information which has a different discernment flag separately given to said the 1st entry point and said 2nd entry point.

[0035] The above-mentioned information record program may be recorded on a predetermined record medium.

[0036]

[Embodiment of the Invention] Hereafter, DVD-RAM, DVD recorder, and DVD player which are 1 operation gestalt of the information record medium applied to this invention using an attached drawing, a recording device, and a regenerative apparatus are explained to a detail.

[0037] DVD-RAM by this invention can manage systematically the data which could record AV data of various formats in the disk of one sheet, and were recorded. It enables this to record the video data which encoded and recorded analog broadcasting on the MPEG transport stream, and the MPEG transport stream transmitted as digital broadcast on the disk of one sheet. Moreover, these data recorded on DVD-RAM are reproducible in predetermined sequence. For this reason, DVD-RAM concerning this invention is equipped with the management information for managing AV stream, without being dependent on the class of format of AV data.

[0038] First, with reference to (a) of drawing 6 , and (b), the DS of the data recorded on DVD-RAM of this invention is explained. (a) of drawing 6 shows the DS on the disk 100 which can be recognized through the file system of the DVD-RAM disk 100. (b) of drawing 6 shows the structure of the physical sector on a disk 100. The lead-in groove field 31 is established in the head part of a physical sector so that it may be illustrated. The standard signal required in order to stabilize a servo, the recognition signal with other media, etc. are recorded on the lead-in groove field 31. The data area 33 is formed following the lead-in groove field 31. Effective data are logically recorded on a data area 33. The management information for file systems called volume information is recorded on the head of a data area 33. Although a file system is for example, a UDF format, since it is a well-known technique, explanation is omitted. Finally the lead-out field 35 is formed. A standard signal etc. is recorded on the lead-out field 35 like the lead-in groove field 31.

[0039] Through a file system, as shown in (a) of drawing 6 , it becomes possible to treat the data in a disk 100 as a directory or a file. As shown in (a) of drawing 6 , all the data that a DVD recorder treats are managed under the DVD_RTAV directory directly under a ROOT directory.

[0040] Two kinds of files, AV file containing an audio video data (AV data) and a management information file including the information for managing those AV files, exist in the file which the DVD recorder of this operation gestalt treats. In the example shown in (a) of drawing 6 , a management information file is a file "M_VOB.VOB" in which "VIDEO_RT.IFO" and AV file contain a video data. Moreover, the file containing the image data for digital broadcast is "D_VOB.VOB." Hereafter, these files are explained to a detail. In addition, this operation gestalt defines each AV stream as an object (Object). That is, various AV streams, such as an MPEG program stream, are contained in an object. Here, the management information of AV stream is defined as unification-ized object information (ObjectI) by abstracting AV stream and regarding as an object.

[0041] First, management information is explained with reference to drawing 7 . Management information VIDEO_RT.IFO of AV file is adopted as an example of management information. Drawing 7 shows the relation between the object of AV file, object information, and program chain (Program Chain;PGC) information. Management information VIDEO_RT.IFO has the PGC information 50 and 70 which defines the object information 80 which manages the record location of an object etc., playback sequence, playback time amount of data which should be reproduced in the data currently recorded on DVD-RAM, etc., and the whole video management information (VMGI: Video Manager General Information) 90. AV stream also has the element (for example, time amount attribute) with which each difference can communalize a certain thing by the format. Therefore, the abstraction mentioned above is possible. Moreover, AV stream which has the same format is stored in order of record in same AV file.

[0042] The object information (ObjectI) 80 consists of general information (Object GI) 80a about an object, attribute information (AttributeI) 80b of an object, access map 80c that changes the playback time amount of an object into the address on a disk, and entry point table 80d about the PGC information 50 which shows the access point (an entry point is called hereafter) to the part of the arbitration of an object.

[0043] Access map 80c is used in order to perform conversion between a time-axis and a data (bit string) shaft. Access map 80c has data which match a time domain and an address field for every object unit. This is because one object consists of two or more object units (VOBU) so that it may mention later. Access map 80c is needed because AV stream generally has two criteria, a time-axis and a data (bit string) shaft, and there is no perfect functionality between these two criteria. For example, in the case of MPEG-2 video which is the International Standard of a video stream, it is

becoming in use to use the Variable Bit Rate method which changes a bit rate according to the complexity of image quality. In this case, since there is no proportionality between the amount of data from a head, and playback time amount, random access on the basis of a time-axis cannot be performed. Therefore, access map 80c which specifies the correlation of time amount and data is needed.

[0044] The PGC information 50 and 70 is used in case playback of the image data recorded on DVD-RAM100 or voice data, i.e., an object, is controlled. The PGC information 50 and 70 shows one unit at the time of a DVD player performing data playback continuously. That is, the PGC information 50 and 70 shows the playback sequence of the cel information 60, 61, 62, and 63 which showed the object to reproduce and the playback section of the arbitration in the object. About cel information 60 grade, it mentions later. PGC information can be classified into two kinds, the original PGC information 50 generated automatically [so that a DVD recorder may contain all record objects at the time of object record], and the custom PGC information 70 that a user can define a playback sequence freely.

[0045] In addition, the entry point (it is also called an original entry point) only about the original PGC information 50 is specified entry point table 80d of the object information 80 explained previously. The entry point (it is also called a user entry point) about the custom PGC information 70 is specified on the entry point table 72 prepared, each cel information 71, for example, the cel information, within the custom PGC information 70. An original entry point is automatically set to the object itself specified into the object information 80 by the DVD recorder. On the other hand, a user entry point is set as arbitration by the user to the salvage pathway of an object.

[0046] In addition, it may be prepared in the original PGC information 50 entry point table 80d. As long as it is in the original PGC information 50, it may be prepared corresponding to each cel information, and may be prepared in [one] the original PGC information 50 as information which is not included in each cel information. Moreover, the entry point table contained in the custom PGC information 70 does not need to be prepared in each cel information one, and may be prepared in [one] the custom PGC information 70 as information which is not included in cel information.

[0047] The configuration and function of the PGC information 50 and 70 are the same except for that the custom PGC information 70 is defined by the user and having the entry point table 72. Therefore, below, the original PGC information 50 is mainly explained to a detail. About the entry point tables 72 and 80d, it mentions later.

[0048] As shown in drawing 7 , the original PGC information 50 includes at least one cel information 60, 61, 62, and 63. Cel information 60 grade specifies the object to reproduce, and specifies the playback section of the object. Usually, the PGC information 50 is recording two or more cels in a certain sequence. The record sequence of the cel information in the PGC information 50 shows playback sequence in case the object specified by each cel is reproduced.

[0049] 60d (Start) of starting position information in type information (Type) 60a which shows the class of object specified by it, multi-view information (View_Type) 60b which an object mentions later, object ID(Object ID)60c which is the identification information of an object, and the object on a time-axis, and termination positional information (End) 60e in the object on a time-axis are contained in the cel information 60, for example, the cel information, on 1. At the time of data playback, the cel information 60 within the PCG information 50 is read one by one, and the object specified by each cel is reproduced by the playback section specified by the cel.

[0050] In order to apply the abstracted object information to actual AV stream, it is necessary to take shape more. This view is intelligible when succession of the class looked at by the object-oriented model and the structure especially materialized to each AV streams by making object information into a superclass are caught with a subclass. Drawing 8 shows the management information of each stream derived from object information. The gestalt of this operation defines each subclass of an animation subclass, a Digital-Video-Broadcasting subclass, and a stream subclass as a subclass of object information so that it may be illustrated. An animation subclass is the animation object information (M_VOBI:Movie Video Object Information) 82 that the object information for videos (MPEG transport stream) is expressed. A Digital-Video-Broadcasting subclass is the Digital-Video-Broadcasting object information (D_VOBI:Digital Video Object Information) 86 that the object information for digital broadcast data (MPEG transport stream) is expressed. A stream subclass is the stream object information (SOBI:Stream Object Information) 89 that the object information for streams that an application is not specified is expressed. Hereafter, each object information is explained.

[0051] The animation object information 82 has general information (M_VOB_GI) 82a of an MPEG transport stream, stream information (M_VOB_STI) 82b of an animation object, time map 82c, and entry point table 82d.

[0052] General information (M_VOB_GI) 82a of the animation object information 82 includes the identification information (M_VOB_ID) of an animation object, the record time of day (M_VOB_REC_TM) of an animation object, the initiation time information (M_VOB_V_S_PTM) of an animation object, and the termination time information (M_VOB_V_E_PTM) of an animation object. Stream information (M_VOB_STI) 82b of an animation object includes video stream information (V_ATR) including the coding mode of a video stream, the number (AST_Ns) of an audio stream, and audio stream information (A_ATR) including the coding mode of an audio stream. Time map 82c contains the start address of the animation object within AV file, the playback time amount (VOBU_PB_TM) of each animation object unit (VOBU), and data size (VOBU_SZ). Here, although an animation object unit (VOBU) shows the minimum access unit in an animation object (M_VOB), the detail is mentioned later.

[0053] The Digital-Video-Broadcasting object information (D_VOBI) 86 has general

information (D_VOB_GI) 86a of an MPEG transport stream, stream information (D_VOB_STI) 86b, time map 86c, and entry point table 86d.

[0054] General information (D_VOB_GI) 86a of a digital broadcast object includes the identification information (D_VOB_ID) of a digital broadcast object, the record time of day (D_VOB_REC_TM) of a digital broadcast object, the initiation time information (D_VOB_V_S_PTM) of a digital broadcast object, and the termination time information (D_VOB_V_E_PTM) of a digital broadcast object. The stream information (D_VOB_STI) on a digital broadcast object includes the information (PROVIDER_INF) which stores the additional information delivered by digital broadcast. Time map 86c contains the start address of the digital broadcast object (D_VOB) within AV file, the playback time amount (VOBU_PB_TM) of each object unit (VOBU), and data size (VOBU_SZ).

[0055] The stream object information (SOBI) 89 has general information (SOB_GI) 89a of Digital Stream, stream information (SOB_STI) 89b of Digital Stream, time map 89c, and entry point table 89d.

[0056] General information (SOB_GI) 89a of Digital Stream includes the identification information (SOB_ID) of a stream object, the record time of day (SOB_REC_TM) of a stream object, the initiation time information (SOB_S_TM) of a stream object, and the termination time information (SOB_E_TM) of a stream object. Stream information (SOB_STI) 89b of SOB includes the information (PROVIDER_INF) which stores the additional information delivered as a stream. Time map 89c includes the SOB start address within AV file, and the playback time amount (SOBU_PB_TM) of every stream object unit (SOBU). The size of each SOBU was mentioned above. It is the same as that of the size of an ECC block, and immobilization. Here, a stream object unit (SOBU) mentions the detail later, although the minimum access unit in a stream object (SOB) is shown.

[0057] Thus, the stream information table which corresponds to each AV stream is defined by materializing the object information abstracted as drawing 8 so that it may be shown.

[0058] Next, with reference to drawing 9 , the correspondence relation of the one, the digital broadcast object information (D_VOBI) 86, and the cel information 60 on the example of object information (ObjectI) is explained.

[0059] If the value of the type information (Type) specified as the cel information 60 is "D_VOB", it means that the cel corresponds to the object for digital broadcast. In addition, it means the cel corresponding to an animation object, if the value of type information is "M_VOB", and corresponding to a stream object, if the value of type information is "SOB."

[0060] When the value of the type information (Type) specified as the cel information 60 is "D_VOB", view type information (View_Type) is specified in cel information. View type information specifies how many there is any view, when it exists [whether a multi-view (after-mentioned) exists in an applicable cel, and]. When a multi-view

exists and it does not exist the number of the greatest view, 0 is set to view type information. Moreover, corresponding object information (VOBI) can be retrieved using Object ID (Object ID). This is realizable using the object ID which shows a digital broadcast object, and the digital broadcast object ID (identification number) (D_VOB_ID) contained in general information (D_VOB_GI) 86a of the digital broadcast object information (D_VOBI) 86 supporting one to one. Thus, the object information corresponding to the cel information 60 can be looked for by using type information (Type) and Object ID (Object ID).

[0061] The starting position information (Start) in the cel information 60 corresponds with the initiation time information (D_VOB_V_S_PTM) of a digital broadcast object. If the value shown by each is the same value (time of day), the cel shows the playback from the head of a digital broadcast object. When the value of starting position information (Start) is larger than initiation time information (D_VOB_V_S_PTM), the cel shows the playback from the middle of a digital broadcast object. In this case, as for that cel, only the difference (time difference) of the value of initiation time information (D_VOB_V_S_PTM) and the value of starting position information (Start) is reproduced behind time from the head of a digital broadcast object. Moreover, it has relation with the same said also of the termination positional information (End) of a cel and the termination time information (D_VOB_V_E_PTM) of a digital broadcast object.

[0062] Thus, based on the starting position information (Start) within the cel information 60, termination positional information (End), the initiation time information (D_VOB_V_S_PTM) in general information (D_VOB_GI) 86a of the digital broadcast object information (D_VOBI) 86, and termination time information (D_VOB_V_E_PTM), playback initiation and the termination location of the cel concerned can be obtained as relative time amount in an animation object.

[0063] Time map 86c in the digital broadcast object 86 is a table which consists of the playback time amount and data sizes of every animation object unit (VOBU). Playback initiation within the animation object of the cel mentioned above and termination relative time amount are convertible for address data by referring to this time map 86c. In addition, an animation object unit (VOBU) is the settlement of two or more packs surrounded by the thick line among VOB(s) showing AV file of drawing. In addition, each pack is the same size as a sector, and image data is stored using one or the pack beyond it.

[0064] Then, with reference to (a) – (f) of drawing 10 , the example of address translation in which the time map was referred to is explained.

[0065] (a) of drawing 10 shows the digital broadcast object (D_VOB) expressing the video presentation on a time-axis. (b) shows the time map which consists of the playback time amount length and data sizes of every animation object unit (VOBU). (c) shows the digital broadcast object expressed on the data (sector train) shaft. (d) shows the pack train to which a part of digital broadcast object (D_VOB) was

expanded. (e) shows a video stream and (f) shows an audio stream, respectively.

[0066] An animation object (D_VOB) is an MPEG transport stream. An MPEG transport stream is the sequence of the pack which turned and bundled two or more these packets (PES packet) a packet (PES packet) in order about a video stream and an audio stream.

[0067] A transport packet (TS packet) is 188 bytes in fixed size. Since 1 sector of DVD-RAM is 2048 bytes, in a sector, two or more transport packets (2048 bytes / 188 bytes = 10TS packet) are recorded with the header information mentioned later.

[0068] The video packet (V_PKT) and audio packet (A_PKT) which were formed into TS packet are multiplexed, and one stream consists of transport streams. (c) of drawing 10 , (d), (e), and (f) show the situation of multiplexing.

[0069] Moreover, the MPEG system stream which is the generic name of a transport stream and a program stream has a time stump in a stream for synchronous playback of the multiplexed video and an audio stream.

[0070] In the case of a transport stream, there is PTS (Presentation Time Stamp) which shows the playback time of day of a frame as a time stump. The initiation time information (D_VOB_V_S_PTM) of the above-mentioned digital broadcast object and the termination time information (D_VOB_V_E_PTM) of a digital broadcast object are the time information searched for on the basis of this PTS.

[0071] Then, an animation object unit (VOBU) is explained. An animation object unit (VOBU) shows the minimum access unit in a digital broadcast object (D_VOB). An MPEG video stream performs picture compression not only using the picture compression which used the spatial frequency characteristics within a video frame but using the motion property on video inter-frame, i.e., a time-axis, and realizes efficient picture compression. The information on the video frame of the information on a time-axis, i.e., the future, and the past is needed, and this means that a video frame cannot be elongated independently, when elongating a certain video frame. In order to solve this problem, in the general MPEG video stream, at a rate of about one sheet, the video frame (I-picture) which does not use the motion property on a time-axis is inserted in 0.5 seconds, and random access nature is raised to them.

[0072] An animation object unit (VOBU) is a settlement specified as the section to the pack in front of the pack which contains the initial data of the following I-picture by making the pack containing the initial data of this I-picture into a head. It is constituted from the data size (the number of TS packets) of each of this object unit (VOBU), and the playback time amount (the number of the fields) of the video frame in an object unit (VOBU) by the time map.

[0073] In addition, the initial data of I-picture are not necessarily the heads of TS packet. For this reason, the last data in a certain object unit (VOBU) may exist in the same TS packet as the initial data in the following object unit (VOBU). For this reason, let data size of an object unit (VOBU) be the number of TS packets of a just before

[TS packet containing the initial data of degree object unit (VOBU), i.e., the following I-picture,].

[0074] For example, it is assumed that the difference of the value shown by Start of a cel and the value which the initiation time information (D_VOB_V_S_PTM) of a digital broadcast object shows was 1 second (60 field). It can ask for the playback start time of each object unit from the head of a digital broadcast object (D_VOB) in integrating the playback time amount of each object unit (VOBU) in time map 86c from a head. It can ask for the address of each object unit from the head of a digital broadcast object (D_VOB) in integrating the data size (the number of TS packets) of each object unit similarly.

[0075] In the case of this operation gestalt, since the object unit (VOBU) of 24, 30, and the 24 field is located in a line from the head of a digital broadcast object (D_VOB), respectively, it is called for that the video frame 1 second (60 field) after the head of a digital broadcast object (D_VOB) is contained in the 3rd object unit (VOBU#3) from the head. Moreover, since the amounts of data of an object unit (VOBU) are 1250, 908, and a 1150TS packet from the head of a digital broadcast object, respectively, it is called for that the start address of the 3rd object unit (VOBU#3) is the 2158TS packet eye from the head of an object, i.e., 8TS packet eye of 215 sectors. The start address of the data which start playback is called for by adding this result and 5010 sectors which are the start addresses (ADR_OFF) of D_VOB within AV file.

[0076] In the above explanation, the playback from the video frame of 60 field eye was assumed from the head. As already explained, since decoding and playback from a video frame of arbitration are impossible, it reproduces from the head of the object unit (VOBU) of 6 field gap ****** on the property of MPEG video so that it may be reproduced from the head of I-picture. However, a decoder can perform only decoding of the 6 fields concerned and it can reproduce from the video field specified by a cel in operating so that it may not display. The playback end time of the digital broadcast object corresponding to the termination location of a cel and the address in AV file can be obtained like the above-mentioned explanation.

[0077] In addition, ID which identifies a broadcasting industry company, and the information on the proper for every broadcasting industry company are included in the PROVIDER_INF field within the stream information on a digital broadcast object (D_VOB_STI).

[0078] Next, animation object information (M_VOBI) is explained. Since animation object information is also the subclass derived from object information, it is the same as digital broadcast object information fundamentally. A big difference is that a ground wave is recorded on videotape and an animation object (M_VOB) is generated. Namely, as for the animation object, it differs greatly in that a recorder is AV stream encoded and obtained to the data transmitted from a digital broadcasting satellite being recorded directly, and a digital broadcast object (D_VOB) being generated. About the

address translation which referred to the time map, it is the same as that of D_VOB.

[0079] For example, 1 sector of DVD-RAM presupposes that it is also the packet in M_VOB 2048 bytes in fixed size as 2048 bytes. Then, in the case of an animation object (M_VOB), it can treat as 1 pack =1 sector. Since the unit which can perform R/W of data to DVD-RAM is a sector, it can be defined as being from a sector to a sector about an animation object unit. About the address translation which referred to T map, it is the same as that of D_VOB fundamentally. In addition, the time map used for the address translation of M_VOB may express this with the number of packs instead of expressing the data size of VOBU with the number of packets like [in D_VOB].

[0080] Next, stream object information (SOBI) is explained. Since stream object information is also the subclass derived from object information, it is the same as digital broadcast object information fundamentally. A big difference is that the contents of the stream cannot analyze the contents by the recorder by the stream object (SOB) to analysis by the recorder being possible in a digital broadcast object (D_VOB). Like an animation object (M_VOB) in a digital broadcast object (D_VOB), the recorder itself encodes data. Therefore, the DS of a stream is obvious and analysis is possible for a recorder. However, in a stream object (SOB), since a recorder records without analyzing data, when data are enciphered for the purpose, such as protection of copyrights, or in not having the decoder to which the recorder corresponded for new service, the internal structure of a stream does not understand a recorder, for example.

[0081] Therefore, when dealing with a stream object (SOB), the time map mentioned above can be created. So, with the gestalt of this operation, a time map is created using ATS (Arrival Time Stamp) showing the arrival time of each TS packet in an MPEG transport stream.

[0082] (a) of drawing 11 and (b) show the relation of the TS packet and header information in a stream object (SOB). In a stream object (SOB), two or more the header information and TS packets containing ATS are arranged in 1 sector by turns. With the gestalt of this operation, since the header information of 4 bytes and TS packet is 188 bytes, the pair of ten header information and TS packets is arranged in 1 sector. The time of day in a stream object (SOB) is specified using this ATS.

[0083] The object in time map 89c (drawing 8) of a stream object (SOB) is specified using a settlement called an SOB unit (SOBU). In a stream object (SOB), since the contents are unanalyzable, the data size of SOBU is fixed. Let data size of SOBU be the size of an ECC block with the gestalt of this operation. Thus, it is not necessary to specify size by time map 89c of a stream object (SOB) by fixing the data size of SOBU. Therefore, a time map is the table of only the arrival time (ATS) information on the head TS packet of an object unit (SOBU). In the case of a stream object (SOB), the initiation time information (SOB_V_S_PTM) of an object and the termination time

information (SOB_V_E_PTM) of an object are the head of an object, or the last TS packet arrival time (ATS), respectively.

[0084] About the address translation which referred to the time map, it is the same as that of D_VOB fundamentally. However, like [in D_VOB], the data size of each object unit (VOBU) is immobilization, and the number of packets does not express it on the time map used for the address translation of SOB.

[0085] In addition, a time map is also generable using PCR (Program Clock Reference) which gives ATS and which exists in instead it being alike in TS packet of an MPEG transport stream. PCR expresses the input time of day to the decoder of each TS packet. In this case, since PCR is not necessarily given to all transport packets, it is necessary to interpolate these values by the recorder.

[0086] ID which identifies a broadcast entrepreneur, and the information on the proper for every broadcast entrepreneur as well as the case of a digital broadcast object are included also in the PROVIDER_INF field within the stream information (S_VOB_STI) on a stream object.

[0087] Drawing 12 shows the configuration of the whole management information in the optical disk of this operation gestalt. The DS explained until now is indicated by drawing 12 . Hereafter, the whole management information is explained. The optical disk by the gestalt of this operation is equipped with the whole video management information 90 and various kinds of file information tables 92, 94, and 96 other than the above-mentioned PGC information 50 and 70 grades.

[0088] The whole video management information VMGI90 is the management information about an entire disk, for example, includes the starting address of the original PGC information 50, the custom PGC information 70 and the various file control tables 92, and 94 grades, i.e., pointer information. By referring to this pointer information, it can access to the PGC information 50 and 70, and a file control table 92 and 94 grades.

[0089] Here, the file control tables 92, 94, and 96 shown in drawing 12 are explained. Each of file control tables 92, 94, and 96 is a table for managing the data file which consists of objects, and is prepared for every class of object. There are the animation file control table 92 which manages the file which recorded the digital broadcast object, the digital broadcast file control table 94 which manages the animation file which recorded the animation object, and a stream file managed table 96 which manages the stream file which recorded the stream object.

[0090] Although object information is specified based on the object ID of the cel information within PGC information as mentioned above, the address of object information is specified through file control tables 92, 94, and 96 in this case. For this reason, file control tables 92, 94, and 96 have information, such as size of the number of the object information to manage, Object ID, and object information. For example, when Object ID shows sequence, based on the object ID specified using cel

information, it can recognize the object information on what position in the object information managed with the file control table the specified object information is. Then, the specified address of object information can be obtained from the sequence of the object information, and a file size by calculating the amount of offset on the basis of the starting address of a file control table.

[0091] As shown in drawing 12 , the digital broadcast file control table 94 is a table which manages the digital broadcast file which recorded the digital broadcast object. The digital broadcast file control table 94 contains 94h (D_AVFITI) of table management information containing the number of digital broadcast object information (D_VOBI) 94a, 94b--, and the digital broadcast object information that the table 94 manages, the size of a digital broadcast object, etc. Digital broadcast object information is recorded only for the number of the digital broadcast object information described by 94h of this table management information after the disk top. Digital broadcast object information 94a-- contains general information (D_VOB_GI), stream information (D_VOB_STI), a time map, and an entry point table as mentioned above. Moreover, a time map contains the display time and size (VOBU_ENT) of each digital broadcast object unit (VOBU). In addition, it has the DS as the digital broadcast file control table 94 also with same managed table (M_AVFIT) 92 of the animation file which recorded the animation object and managed table (S_AVFIT) 96 of the stream file which recorded the stream object.

[0092] Cel information is recorded on the order which should be reproduced to the original PGC information 50. Cel information has the correspondence information (a type and Object ID) on object information, and the playback section information (Start and End) within an object. The playback section information which a cel shows is convertible for the address information of the object actual condition through the access map within object information.

[0093] If it removes whether it has an entry point table or it has as mentioned above, the DS of the custom PGC information 70 is the same as the DS of the original PGC information 50.

[0094] As mentioned above, it can define by abstracting the management information for AV streams previously, without depending on peculiar information for the PGC information which is playback control information for every AV stream format, and AV stream can be managed integrative. The environment where a user can do playback of AV data freely by this, without being conscious of AV format is realizable.

[0095] Moreover, what is necessary is just to specify the management information derived from object information like the existing AV format according to above-mentioned DS, even if it is the case where new AV format is incorporated. Thereby, a new format can be incorporated easily in DS.

[0096] Next, an entry point table is explained to a detail. An entry point is an access point for a user to start playback from the arbitration point of the program recorded

on videotape on the disk. For example, the entry point about the original PGC information 50 is recorded on entry point table 80d prepared in the object information 80, and, on the other hand, the entry point about the custom PGC information 70 is recorded on the entry point table 72 prepared in each cel information 71 on the custom PGC information 70, for example, cel information, as indicated by drawing 7 .

[0097] Like the start location of a cel, and a termination location, in the case of a digital broadcast object (D_VOB) and an animation object (M_VOB), it is specified using PTS, and, in the case of a stream object, is specified by the entry point using ATS.

[0098] A setup of an entry point is performed as follows. First, digital satellite broadcasting service includes much additional information other than AV stream. In digital satellite broadcasting service, AV stream of No. 1 grouping is identified using the information dedicated to a special table called the program specification information PSI (Program Specific Information). The program specification information PSI and the service information SI (Service Information) are information which controls playback of a transport stream. Specifically, AV stream of No. 1 grouping is obtained by extracting two or more TS packet trains which constitute the program concerned from TS packet group of the video corresponding to two or more programs included in a transport stream, and an audio stream. Two or more TS packet trains which constitute the program concerned can be specified using the packet ID information (PID) given to each packet. This packet ID information (PID) is recorded on the programmed map table (PMT) within the PSI information corresponding to the program concerned. Digital satellite broadcasting service includes interactive information, such as data broadcasting, and service which was not able to be realized is realized in the conventional analog broadcasting.

[0099] There is a function of a multi-view in digital broadcast, and two or more animations arranged in parallel in time in one program can be included. About a multi-view, although indicated in detail by ARIBTR-B15, this specification explains the DS which realizes a multi-view simply with reference to drawing 13 . Drawing 13 is drawing showing the DS of the event information table EIT explaining a multi-view (Event Information Table).

[0100] When reproducing the view of Maine, the table of component_group_id="0x0" is referred to. In the table of component_group_id="0x0", it turns out that component_tag of a corresponding animation stream is V0. Next, the table of a user presentation unit is referred to and it turns out that component_tag is the stream to which TS packet train with PID of 0x01 corresponds since Video_PID of V0 is "0x01." Similarly, it turns out that the voice stream corresponding to the view of Maine is TS packet train with PID of 0x02. In the digital television, the Maine view of a multi-view program is displayed to a user by decoding these streams.

[0101] Moreover, in addition to this, AV stream of digital broadcast includes much

additional information other than an image and speech information. There is parental information for not showing a childhood person the information about data broadcasting which enables interactive actuation by the user, and the contents for adults etc. in such additional information. The information about data broadcasting is sent out with the karroo cell method. A karroo cell method means repeating and sending out the data of these contents accumulated for every fixed time amount for every unit smaller than a file or it. Since data are repeatedly sent out even if it is the communication mode of an one direction called broadcast by adopting a karroo cell method, the data required by the way which are the need are acquirable.

[0102] If it views and listens from the head of a karroo cel when viewing and listening to data broadcasting, since a data requirement is acquirable in a short time, it is efficient. Moreover, if the viewing-and-listening prohibition part of the childhood person by parental one can be skipped and it can reproduce, efficient time shift viewing and listening is realizable.

[0103] It cuts and replaces and a user accesses a program often [these] at a point. That is, a user can access the program efficiently recorded on the optical disk by these things [cutting and replacing and making a point into an entry point]. Automatic detection and automatic setting are possible for such an entry point by the recorder.

[0104] On the other hand, a user may set up an entry point for a favorite scene etc. uniquely. For a user, the entry point which oneself was conscious of and set up, and the entry point set automatically by the recorder are different things. Since derangement will be produced if these are made to display and choose it as coincidence, distinguishable DS is needed.

[0105] With the gestalt of this operation, the entry point set automatically and the entry point by user setup were distinguished by setting attribute information as each entry point. Drawing 14 shows the entry point table which can set attribute information as an entry point. An entry point table is equipped with the USER_EP flag information which shows what the user specified being conscious of this entry point to each entry point. For example, to a user entry point, the discernment flag 1 is given and the discernment flag 0 is given to an original entry point. By referring to flag information, a recorder or a player can display clearly whether it is that to which the entry point concerned was set by the user on a user.

[0106] Furthermore, an entry point table receives each entry point. PG_Change which shows that it is the changed part of a program, PSI_SI which shows that it is the changed part of the PSI/SI information in a transport stream, SQH_Change which shows that the attribute of the MPEG stream in a transport stream was changed, Data_Top which shows the head point of a data karroo cel, Data_Change which shows the Make Changes point of a data karroo cel, PMT_Change which shows the changed part of PMT, DE_Change which shows the updating point of a data event, Each flag information on Module_Change which shows a modular updating point, and

Aud_Change which shows that the voice attribute was changed, Since it corresponds to a multi-view, it has the Multi_View field and parental (viewing-and-listening limit to junior) information field which show the number of views of a program. The entry point table is equipped with this management information in an optical disk, or the link information to files other than AV stream to each entry point. In the case of a digital broadcast object (D_VOB) and an animation object (M_VOB), this link information is PTS to each entry point, and, in the case of a stream object, it is ATS.

[0107] A recorder can display ******, all entry points, and the attribute information (PG_Change, PSI_SI, SQH_Change, Data_Top, Data_Change, PMT_Change, DE_Change, Module_Change, Aud_Change, Multi_View field, parental information) of those to a user on whether the USER_EP flag is set up, in case a user sets up an entry point. A user does marking of the entry point which oneself needs for edit from the attribute information to all the these-displayed entry points. When the entry point by which marking was carried out is set up by the recorder, USER_EP flag"1" is set to the entry point by which marking was carried out by the recorder. a user -- before -- setting up -- **** -- an entry point -- again -- marking -- having carried out -- a case -- **** -- the former -- USER_EP -- a flag -- " -- one -- " -- holding -- having .

[0108] Moreover, a user may set an entry point as the part which is not detected automatically. In this case, a user operates a recorder, chooses a desired scene and sets up an entry point. In case this entry point is registered into an entry point table by the recorder, USER_EP flag"1" is set up.

[0109] A recorder displays only the entry point to which the USER_EP flag is set to the user in edit of PGC. By this, without troubling to the entry point which oneself is not conscious of and which was detected by automatic setting, a user can choose only a required entry point and can edit PGC.

[0110] It is enough if it is the entry point table shown in drawing 14 , and entry point table 80d of the object information 80 is prepared. However, separate ****** is also good in the custom PGC information 70 (drawing 7) as explained until now. In this case, it may be contained in cel information and does not need to be contained.

[0111] By managing on a separate table as shows the entry point set automatically and the entry point by user setup to drawing 15 , each entry point is also distinguishable. Drawing 15 is drawing showing an automatic setting entry point table and a user setting entry point table. The table of the entry point by which it was set automatically for the reason only at the time of record by the recorder that an entry point is set automatically should be set only to original PGC information. The attribute information on the entry point explained previously is recorded on this table. On the other hand, a user setting entry point table is prepared in the cel information on the custom PGC information 70 (drawing 7). In addition, the table of the entry point set automatically may be prepared in the original PGC information 50 (drawing 7) instead of the object information 80 (drawing 7).

[0112] In addition, in the multi-view mentioned above, the entry point table corresponding to each view may be prepared as another example. Drawing 16 is drawing showing the entry point table prepared corresponding to each view. Thereby, the entry point for every view is easily manageable. Needless to say, the record field of attribute information may be established in each entry point table.

[0113] Next, with reference to drawing 17 , the player model which plays the optical disk mentioned above is explained. A player 1700 is equipped with the optical pickup 1701 which reads data from an optical disk 100, the ECC processing section 1702 which performs the error correction of the read data etc., the track buffer 1703 which stores the read-out data after an error correction temporarily, an animation object (M_VOB), the TS decoder 1706 which reproduces transport streams, such as a digital broadcast object (D_VOB), and the control section 1711 which controls each part of a player 1700 as shown in drawing 17 .

[0114] The player 1700 has the digital interface 1704 for supplying AV stream outside further. It is also possible for this to supply AV stream outside through communications protocols, such as IEEE1394 and IEC958. When new AV format is incorporated especially, this is outputted to an external AV equipment through the digital interface 1704, without minding the decoder of the player 1700 interior, and when making it reproduce with the AV equipment, it becomes effective. What is necessary is just to have further the decoder 1709 corresponding to new AV format connected to a track buffer 1703 like other decoders, when a player 1700 supports new AV format.

[0115] Playback actuation of a player 1700 is explained below. A player 1700 reads the data currently recorded on the optical disk 100 using an optical pickup 1701. The ECC processing section 1702 performs ECC processing to the read data, and obtains a transport stream (TS). The transport stream (TS) which carried out ECC processing is stored in a track buffer 1703. When a transport stream (TS) can be decoded, a control section 1711 operates the selection section 1710, and connects a decoder 1706 with a track buffer 1703. It separates into the video data which had the transport stream (TS) encoded, and audio data, and a decoder 1706 decodes each. And the video data and audio data which were decoded are outputted. In addition, what is necessary is just to make the decoder 1709 corresponding to new AV format prepare and decode, when a control section 1711 judges [that a transport stream (TS) cannot be decoded and].

[0116] Next, with reference to drawing 18 , the configuration and actuation of a DVD recorder which record data are explained to the optical disk mentioned above. Since a DVD recorder can also perform playback of the data recorded on the optical disk, it also explains playback actuation later.

[0117] As shown in drawing, the DVD recorder 1900 As the input section which receives a display and the demand from a user to a user The system control section

1902 which manages management and control of the ** user interface (user I/F) section 1901 and the DVD recorder 1900 whole, the analog tuner 1903 which receives VHF and UHF, and an analog signal are changed into a digital signal. The stream (MPEG transport stream) which consists of an encoder 1904 furthermore encoded to an MPEG transport stream, a digital tuner 1905 which receives the data stream of digital satellite broadcasting service, and encoded digital data It has the displays 1907, such as the analysis section 1906 to analyze, television, and a loudspeaker, and the decoder 1908 which decodes AV stream. A decoder 1908 contains not only the decoder 1706 shown in drawing 17 but the added decoder 1709. Furthermore, the DVD recorder 1900 is equipped with the drive 1911 which has the digital interface section 1909, the track buffer 1910 which stores the data written in DVD-RAM temporarily, the motor made to rotate DVD-RAM100, the laser radiation section which writes data in DVD-RAM100, an optical pickup, etc. The digital interface section 1909 is an interface which outputs data to an external instrument with communications protocols, such as IEEE1394.

[0118] As for the DVD recorder 1900, the user interface section 1901 receives the demand from a user first. The user interface section 1901 tells the demand from a user to the system control section 1902, and the system control section 1902 performs a processing demand for the demand from a user to an interpretation and each module.

[0119] Hereafter, with reference to drawing 19 , actuation in case the demand from a user is the image transcription of digital broadcast is explained. Drawing 19 is a flow chart which shows image transcription processing of the DVD recorder 1900 (drawing 18).

[0120] The digital broadcast image transcription demand by the user is told to the system control section 1902 through the user interface section 1901. The system control section 1902 requires reception of digital broadcasting from the digital tuner 1905, and requires the data analysis of the MPEG transport stream from the analysis section 1906 further. The analysis section 1906 extracts initiation time information (D_VOB_V_S_PTM) from an MPEG transport stream first as information required for generation of digital broadcast object information (D_VOBI), and sends it to the system control section 1902 (step S191).

[0121] Further, the analysis section 1906 determines and divides the object unit (VOBU) in an MPEG transport stream, and sends the time amount length and size of an object unit required for time map generation to the system control section 1902 (step S192). In addition, an object unit (VOBU) can be determined by detecting I-picture in a transport stream.

[0122] The MPEG transport stream sent from the digital tuner 1905 is transmitted to a track buffer 1910 through the analysis section 1906. The system control section 1902 outputs a record demand to drive 1911, and drive 1911 takes out the data stored

in the track buffer 1910, and it records it on the DVD-RAM disk 100 (step S193). At this time, the system control section 1902 is directed to drive 1911 in accordance with where [on a disk] it records from the allocation information on a file system.

[0123] The analysis section 1906 is combined with detection of object unit time information, supervises the MPEG transport stream under reception, and detects change of the attribute (step S194). The example of the concrete detection approach in BS digital broadcasting is given to below. In order that a record device may detect the changed part of each information on (a) – (k) at this time, it shall have the memory where only the fixed amount of data saves former information.

[0124] In addition, although it is only an example and may not be based on the DS specified by ARIB in part, even if the detection approach mentioned here detects using the DS based on a convention of ARIB, it is easy to be natural [the approach].

(a) PG_Change : with reference to event_id (drawing 20) in EIT (Event_Information_Table) in a digital broadcast stream, when change arises in this value, add.

(b) PSI/SI : It is the table which constitutes the PSI/SI information in a digital broadcast stream. PAT (Program_Association_Table), CAT (Conditional_Access_Table), NIT (Network_Information_Table), BIT (Broadcaster_Information_Table), With reference to version_number (drawing 21) of SDT (Service_Description_Table) and EIT (Event_Information_Table), when change arises in this value, it adds.

(c) SQH_Change : with reference to the sequence header information in the MPEG 2 stream in a digital broadcast stream (drawing 22), when this changes, add.

(d) Data_Top : when dsmccMessageHeader() (drawing 23) in DII in a digital broadcast stream (DownloadInfoIndication) is detected, add.

(e) Data_Change : with reference to transaction_id (drawing 24) in dsmccMessageHeader() in DII in a digital broadcast stream, when change arises in this value, add.

(f) PMT_Change : with reference to version_number (drawing 25) in PMT (Program_Map_Table) in a digital broadcast stream, when change arises in this value, add.

(g) DE_Change : with reference to data_event_id in downloadID in the DII message in a digital broadcast stream (drawing 26), when change arises in this value, add.

(h) Module_Change : with reference to module_version in the DII message in a digital broadcast stream (drawing 27), when change arises in this value, add.

(i) With reference to component_type in the voice component descriptor in EIT in an Aud_Change:digital broadcast stream, and sampling_rate (drawing 28) in the voice component descriptor in EIT, when change arises in the value, it adds.

(j) Multi_View : this adds with reference to num_of_group (drawing 29) in the component group descriptor in EIT in a digital broadcast stream.

(k) Parental information : add by referring to the parental rate information on the

rating field in the parental rate descriptor in private_data_byte in the limited receiving method descriptor in PMT in a digital broadcast stream, or EIT (Event_Infomation_Table) (drawing 30).

[0125] Again, when the analysis section 1906 detects contents change of an MPEG transport stream with reference to drawing 19 , such detection information is combined with the time information at that time, and is sent to the system control section 1902 as entry point information (step S195). The system control section 1902 creates the entry point table which is the set of entry point information.

[0126] It is directed by the stop demand from a user whether end an image transcription (step S196). The image transcription deactivate request from a user is told to the system control section 1902 through the user interface section 1901, and the system control section 1902 advances a deactivate request to the digital tuner 1905 and the analysis section 1906. When a user to an image transcription deactivate request cannot be found, the processing from step S192 is repeated and an image transcription is continued as it is.

[0127] The analysis section 1906 sends the display end time (D_VOB_V_E_PTM) of the last of the animation object unit (VOBU) of the MPEG transport stream which received the analysis deactivate request from the system control section 1902, and analyzed analysis processing at a stop and the last to the system control section 1902.

[0128] After reception termination of digital broadcast, based on the information received from the analysis section 1906, the system control section 1902 generates digital broadcast object information (D_VOBI), next generates the cel information corresponding to this digital broadcast object information (D_VOBI). At this time, "D_VOB" is set up as type information within cel information. The system control section 1902 generates an entry point table from the entry point information received from the analysis section 1906 at this time (step S197). Moreover, the system control section 1902 sets up the view type (View Type) of the recorded cel based on entry point information at this time.

[0129] Finally the system control section 1902 requires record of digital broadcast object information and cel information as record termination of the data stored in the track buffer 1910 to the drive 1911. Drive 1911 records the remaining data of a track buffer 1910, and digital broadcast object information (D_VOBI) and cel information on the DVD-RAM disk 100, and ends image transcription processing (step S198).

[0130] Also when the demand from a user is the image transcription of analog broadcasting, same processing is performed fundamentally. However, since it is encoded by the transport stream by the encoder section 1904, the points that VOBU is generated by the device differ.

[0131] When the demand from a user is stream record, same processing is performed fundamentally. However, since analysis of a stream object (SOB) is not performed, that each time information is set up by ATS differ.

[0132] In the above, actuation was explained based on the image transcription initiation from a user, and a termination demand. However, it is that the point that the system control section publishes image transcription initiation and a termination demand automatically is only different in the case of timed recording currently used also, for example with the conventional VTR instead of a user, and actuation of the DVD recorder 1900 is essentially the same.

[0133] Hereafter, with reference to drawing 31 , the actuation in the case of being playback of the data with which the demand from a user was recorded on DVD-RAM is explained. Drawing 31 is a flow chart which shows regeneration of the DVD recorder 1900 (drawing 18). Below, the case where the original PGC which consists of one animation object (D_VOB) and one cel information is reproduced is explained. In addition, about the playback actuation explained below, the previous DVD player 1700 (drawing 17) can also realize the same actuation.

[0134] First, the user interface section 1901 receives the playback demand of Original PGC from a user. The user interface section 1901 tells the demand from a user to the system control section 1902, and the system control section 1902 interprets it as the demand from a user being a playback demand of Original PGC, and it performs a processing demand to each module. The system control section 1902 analyzes the original PGC information 50 (drawing 7) and cel information 60 grade (drawing 7), and specifies the object which should be reproduced (step S311). That is, the system control section 1902 analyzes the type information within the cel information within PGC information first. When type information is "D_VOB", AV stream to reproduce judges that it is AV stream recorded as an MPEG transport stream. Next, the system control section 1902 discovers the digital broadcast object information (D_VOBI) that it corresponds from ID of cel information, from a table (D_AVFIT) (step S312). Then, the system control section 1902 pinpoints the location of the object in DVD-RAM based on the initiation time information (D_VOB_V_S_PTM) and the termination time information (D_VOB_V_E_PTM), and the time map of animation object information (step S313). If the location of an object can be pinpointed, the system control section 1902 will ask for the initiation and the ending address in DVD-RAM of AV data to reproduce based on initiation and the termination positional information, and the time map of cel information (step S314).

[0135] If the address which should be accessed is obtained, the system control section 1902 will send the read-out demand from the DVD-RAM disk 100 with the read-out address to drive 1911. Drive 1911 reads AV data from the address directed in the system control section 1902, and stores them in a track buffer 1910 (step S315). The system control section 1902 performs a decoding demand to a decoder 1908. A decoder 1908 reads AV data stored in the track buffer 1910, and performs decoding. Decoded AV data are outputted through a display 1907 (step S316).

[0136] It judges whether read-out of all the data directed from the system control

section 1902 ended the drive 1911 (step S317). When having not ended, the processing from step S315 is repeated and read-out of AV data is continued. When it ends, drive 1911 is read to the system control section 1902, termination is reported, and the system control section 1902 advances a playback termination demand to a decoder 1908. After reproducing data, and a track buffer's 1910 becoming empty and completing decoding and playback of all data until a track buffer 1910 becomes empty, a decoder 1908 reports playback termination to the system control section 1902, and regeneration ends it.

[0137] In the above, the original PGC which consists of one digital broadcast object (D_VOB) and one cel information was explained to the example. However, when Original PGC contains only one animation object (M_VOB), two or more animation objects are included and two or more digital broadcast objects are included, or even when an animation object and a digital broadcast object are intermingled, AV stream can be reproduced by performing same processing. Moreover, the same is said of the case where Original PGC contains two or more cels, and the case of custom PGC.

[0138] Next, an example in case a decoder 1908 has no regenerative function of AV streams is explained to a stream object (SOB). When drawing 18 reference is carried out again, for example, the decoder 1908 does not have the regenerative function of an MPEG transport stream, a stream cannot be reproduced through a decoder 1908 as mentioned above. Then, in this case, data are supplied to an external instrument through the digital interface section 1909, and data are reproduced with an external instrument.

[0139] The system control section 1902 performs the external output request of data to the digital interface 1909 instead of the playback demand to a decoder 1908, when it is detected that the cel information within the PGC information in which the playback demand was done by the user is the stream object (SOB) which the system is not supporting. The digital interface section 1909 performs a data transfer according to the communications protocol of the digital interface which has connected AV data stored in the track buffer 1910. In addition, it is the same as that of the time of playback of a digital broadcast object (D_VOB) except the processing mentioned above. The system control section 1902 may judge in person whether the decoder 1908 supports AV stream for playback, and you may make it ask it to a decoder 1908 from the system control section 1902. A decoder 1908 judges whether with reference to the PSI/SI information on an MPEG transport stream, oneself supports this stream.

[0140] it should mind -- since the contents of the stream are unanalyzable about a stream object (SOB), some regenerative functions may be restricted Since it is necessary to repeat and send out refreshable stream data independently, especially the so-called special playback, for example, slow playback, it is difficult to realize in SOB which cannot analyze the contents of stream data.

[0141] Then, with reference to the type information on the cel concerned, when directions of such special playback are received from a user, the recorder 1900 by the gestalt of this operation will notify the purport in which the directed special playback is impossible to the user I/F section 1901, if this is SOB.

[0142] Moreover, since the limit mentioned above can be considered for stream object (SOB) playback, in case PGC which specifies the playback sequence of a series of AV streams is created, it is also possible to forbid that a stream object (SOB), other objects (D_VOB), i.e., a digital broadcast object, and an animation object (M_VOB) should be intermingled in one PGC.

[0143] Hereafter, processing when there is a demand of an entry point setup from a user is explained to the optical disk with which AV data were recorded. Drawing 32 is a flow chart which shows setting processing of a user entry point. When there is a demand of an entry point setup from a user through the user I/F section 1901 (drawing 18) (step S321), the system control section 1902 (drawing 18) reads an entry point table from a disk, and displays all the entry points of the entry point table in an applicable cel, and the attribute information set up on the user I/F section 190 (step S322). The automatic setting entry point table and user setting entry point table which are indicated to be an entry point table here to drawing 15 are meant. That is, entry point table 80d of the entry point table 72 of the cel information 71 on the custom PGC information 70 (drawing 7) and the object information 80 (drawing 7) is meant. However, only a user setting entry point table is. Moreover, when attribute information is not especially required, it is not necessary to display.

[0144] Attribute information In addition, for example, PG_Change which shows that it is the changed part of a program, PSI_SI which shows that it is the changed part of the PSI/SI information in a transport stream, SQH_Change which shows that the attribute of the MPEG stream in a transport stream was changed, Data_Top which shows the head point of a data karroo cel, Data_Change which shows the Make Changes point of a data karroo cel, PMT_Change which shows the changed part of PMT, DE_Change which shows the updating point of a data event, They are each flag information on Aud_Change which shows that the Module_Change voice attribute which shows a modular updating point was changed, and the Multi_View field and parental information which show the number of views of a program since it corresponds to a multi-view.

[0145] Based on all the displayed entry points and attribute information, a user performs playback from the point if needed, finds easily the diving location to the request scene of a desired program, and a desired data program and a desired multi-view scene, and can carry out the thing of it.

[0146] A user specifies marking which shows that the entry point was chosen as a recorder 1900 (step S323). The system control section 1902 of a recorder 1900 will add an entry to a user setting entry point table, if the marking directions to an entry point are received from a user (step S324). When a user wants to set an entry point as

locations other than an original entry point at this time, the starting position and termination location of the partial section of the stream which wishes to set up are specified. The system control section 1902 of a recorder 1900 acquires the time information PTS corresponding to the starting position based on the information on the received starting position. The system control section 1902 registers into time information EP_PTM the time information PTS which added the entry to the user setting entry point table, and was acquired. In addition, when not preparing two kinds of entry point tables (drawing 15) but managing the entry point set automatically and the entry point which the user set up on one table (i.e., when using the entry point table of drawing 14), the USER_EP flag of an entry point table is set up.

[0147] Processing is ended when a setup of an entry point is completed (step S324). When having not completed, the processing from step S322 is repeated and all the entry points set up by then and the attribute information set up are displayed.

[0148] Next, regeneration of a user entry point is explained with reference to drawing 33 . Drawing 33 is a flow chart which shows regeneration of a user entry point. The system control section 1902 will judge whether a user setting entry point table (namely, the entry point table 72 or the table of the lower berth of drawing 15) exists in an optical disk, if the playback demand of an entry point is received from a user (step S331) (step S332). When a user setting entry point table exists, the table is read, it stores in the memory area for a display, and an entry point is displayed (step S334). A user becomes possible [choosing a playback start point only from a required entry point], without troubling many entry points which oneself is not conscious of being displayed. When a user setting entry point table does not exist, an automatic setting entry point table is read, it stores in the memory area for a display, and an entry point is displayed (step S334). In addition, what is necessary is to read only the entry point set up with reference to whether the USER_EP flag is set up about each entry point, in using the entry point table of drawing 14 .

[0149] If a user chooses an entry point, the system control section 1902 will receive the information which specifies the selected entry point from the user I/F section 1901 (step S335). The system control section 1902 detects time information EP_PTM corresponding to the applicable entry point of an entry point table (step S336). The precision of the time information of each entry point in an entry point table is 27MHz usually used by MPEG. In addition, the value which omitted the frame number of video and the lower order bit (90kHz or 27MHz) for this is sufficient.

[0150] Furthermore, the system control section 1902 changes time information into the sector positional information on a disk using the time map prepared in the object information on a corresponding object (D_VOB) (step S337). The system control section 1902 reproduces the MPEG transport stream on an optical disk from this sector location (step S338).

[0151] Thus, playback of an image or voice is performed from the entry point which is

the scene of a user request. At this time, if this is values other than zero, i.e., the system control section 1902 shows the multi-view with reference to the view type within cel information (View Type), it will notify the view type within cel information (View Type) to the user interface section 1901. Based on the notified view type, the DVD recorder 1900 can display the number of views of a multi-view as for example, OSD (On Screen Display) information on user interface section 1901 screen.

[0152] By explanation relevant to drawing 32 , drawing 33 , and these, it explained having displayed all the entry points. However, it is necessary to not necessarily display no entry points. For example, only the entry point which shows a predetermined attribute change may be displayed alternatively, and only the entry point which exists in a predetermined time zone may be displayed alternatively. Such selection can be performed based on the attribute information prepared in the entry point table, or time information (EP_PTM).

[0153] In addition, in playback of a DVD recorder, when AV stream which the decoder is not supporting was reproduced, it was presupposed that it reproduces through a digital interface. However, even if it is AV stream which the decoder is supporting, you may make it output to external instruments, such as a set top box, through a digital interface by demand of a user.

[0154] Moreover, although this invention was explained as an optical disk, an optical disk recorder, and an optical disk player, even if it is the case where an MPEG transport stream is recorded, for example on other media, such as a hard disk, the same effectiveness is acquired by performing same processing with the same component. Therefore, it is not restricted to physical media in essence. However, the central processing unit (CPU) of PC and an image processing IC may bear "the same component" in this case. CPU at this time etc. operates based on the record program which can be executed by computer according to processing of the flow chart (drawing 19 , drawing 31 - drawing 33) mentioned above. The program itself [such] is recorded on various storages, such as a flexible disk, an optical disk, and a semiconductor memory, or it is transmitted through communication lines, such as the Internet, and is installed in PC.

[0155] With the gestalt of this operation, it explained having used the MPEG transport stream as self encoding. However, an MPEG program stream may be used and you may be a stream by other formats.

[0156]

[Effect of the Invention] According to the information record medium of this invention, the transport stream sent by digital broadcast with other AV streams can be recorded, and it becomes possible further to identify what the user set up to the entry point of the recorded digital broadcast object. To moreover, each entry point information in an entry point table The flag which shows that it is the changed part of a program, the flag which shows that it is the changed part of PSI/SI information, The flag which

shows that the attribute of an MPEG stream was changed, the flag which shows the head point of a data karroo cel, The flag which shows the point where the contents of the data karroo cel were changed, the flag which shows the point where the contents of PMT were changed, The flag which shows the point where the module changed, the flag which shows the point where the data event was changed, and the flag information which shows that the voice attribute was changed, The field and parental information field which show the number of views of a program can be prepared, and it can be made easy by displaying this that a user finds a desired scene from such information. Moreover, this can be shown to a user when a cel consists of multi-views.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram of the drive equipment of a DVD recorder.

[Drawing 2] It is drawing showing the conventional AV equipment and the relation of media.

[Drawing 3] It is drawing showing an MPEG program stream and a transport stream.

[Drawing 4] It is drawing showing the relation of the AV equipment and media which a DVD recorder aims at.

[Drawing 5] It is drawing explaining the menu of a DVD recorder.

[Drawing 6] (a) is drawing showing the relation between AV file and a directory. (b) is the conceptual diagram showing the address space on a disk.

[Drawing 7] It is drawing explaining the relation between an object, object information, and PGC information.

[Drawing 8] It is drawing showing each stream management information derived from object information.

[Drawing 9] It is drawing showing the relation between digital broadcast object information (D_VOBI) and PGC information with a digital broadcast object (D_VOB).

[Drawing 10] (a) – (f) is drawing explaining the time map concerning this invention.

[Drawing 11] It is drawing showing the relation of the TS packet and header information in a stream object (SOB).

[Drawing 12] It is drawing explaining the management information in DVD-RAM.
[Drawing 13] It is the explanation image Fig. of a multi-view.
[Drawing 14] It is the explanatory view of the entry point concerning this invention.
[Drawing 15] It is the explanatory view of an automatic setting entry point table and a user setting entry point table.
[Drawing 16] It is drawing showing the entry point table prepared corresponding to each view.
[Drawing 17] It is the block diagram of the player model concerning this invention.
[Drawing 18] It is the block diagram of a DVD recorder.
[Drawing 19] It is the flow chart which shows record actuation of a recorder.
[Drawing 20] It is the explanatory view of EIT for PG_Change detection.
[Drawing 21] It is the explanatory view of the PSI/SI information for PSI/SI detection.
[Drawing 22] It is the explanatory view of the MPEG 2 stream for SQH_Change detection.
[Drawing 23] It is the explanatory view of DII for Data_Top detection.
[Drawing 24] It is the explanatory view of DII for Data_Change detection.
[Drawing 25] It is the explanatory view of PMT for PMT_Change detection.
[Drawing 26] It is the explanatory view of DII for DE_Change detection.
[Drawing 27] It is the explanatory view of DII for Module_Change detection.
[Drawing 28] It is the explanatory view of EIT for Aud_Change detection.
[Drawing 29] It is the explanatory view of EIT for Multi_View detection.
[Drawing 30] They are PMT for parental information detection, and the explanatory view of EIT.
[Drawing 31] It is the flow chart which shows playback actuation of a recorder.
[Drawing 32] It is the flow chart which shows setting processing of a user entry point.
[Drawing 33] It is the flow chart which shows regeneration of a user entry point.
[Description of Notations]
50 70 PGC information (PGCI: Program Chain Information)
60 Cel Information (CellI: Cell Information)
60b View type information
60f Entry point table
80 Object Information (OBJECT I: Object Information)
80c Access map
100 DVD-RAM (Optical Disk)
1700 Player
1701 Optical Pickup
1704, 1909, 2005 Digital interface section
1706 TS Decoder
1710 Selection Section
1711 Control Section

1900 Recorder
1901 User Interface Section
1902 System Control Section
1906 Analysis Section
1908 Decoder
1909 Digital Interface Section
1911 Drive